WEST RIVER
GUILFORD, CONNECTICUT

Small Boat Navigation Project

Reconnaissance Report

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS
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INTRODUCTION

This report is a preliminary engineering and economic feasibility study of navigation improvements in the West River in Guilford, Connecticut.

The West River is one of two coastal rivers flowing into Long Island Sound at Guilford, Connecticut (Figure 1). The river is used by a number of recreational craft and a small number of commercial fishing boats. Local interests have identified the need for improving the river channel in order to increase the operational efficiency of many of the craft currently using the river.

In a letter dated 5 November 1979, the town of Guilford requested that the Corps of Engineers initiate an investigation to study the feasibility of Federal participation in the improvement of the river channel. This study, initiated under the authority of Section 107 of the 1960 River and Harbor Act, is in response to that request and was prepared as the first step in a two stage study process. The purpose of this reconnaissance is to determine if there is economic justification for carrying out a detailed study of navigation improvements. This report does not formulate the optimum plan of improvement, but only attempts to determine if there is some feasible plan that may, with detailed study, prove to be in the Federal interest if constructed. If some plan is shown, at this stage of study, to be economically feasible, a recommendation will be made that a detailed study be performed in which several plans will be evaluated to identify the optimum plan of improvement.

Study Authority

This reconnaissance report is submitted under the authority of Section 107 of the 1960 River and Harbor Act, as amended.

Purpose and Scope of Study

Local interests have requested that the Corps of Engineers study the feasibility of providing navigation channel improvements in the West River. This study was performed to determine if there is economic justification for undertaking a detailed study of channel improvements to the West River. The study was developed using information obtained from the town of Guilford, concerned citizens, and a reconnaissance investigation of the area. The scope was limited almost exclusively to economic considerations, but if a detailed study is performed, other parameters, such as environmental and social impacts, will be fully evaluated.

The geographic scope of this study was limited to the West River and that area immediately surrounding it.

Study Participants and Coordination

Officials of the town of Guilford and interested citizens and local organizations were coordinated with closely, in an attempt to define the problems and needs of the study area and to identify readily available data to be used in this report.

If a detailed study is performed extensive coordination will be carried out in the detailed report phase with all appropriate Federal, State, regional, and local interests.

Previous Studies

There is no existing Federal project in the West River at the present time. However, in 1971 the Corps of Engineers was directed by the Committee on Public Works of the House of Representatives to study the advisability of improvements to navigation and beach erosion control in Guilford. That report, completed in February 1976, recommended that no improvements be undertaken in the West River, as they could not be economically justified at that time. No other studies are known to have been undertaken in the area of the West River.

The Report and Study Process

This report is the culmination of a reconnaissance effort, designed to utilize readily available data to make a preliminary evaluation of the feasibility of performing a detailed study of navigational improvements to the West River. Most of the data utilized was obtained from local sources. All pertinent information accumulated in this data review is included in the body of this report. The preliminary nature of this report must be emphasized and it should be noted that any plans of improvement evaluated in this report are not necessarily those which will eventually become the proposed plan of improvement should future study efforts be performed.

PROBLEM IDENTIFICATION

In this section, background information about existing conditions is presented along with a description of conditions expected to occur without any Federal action. This information is analyzed to identify problems, needs, and opportunities for the study area, from which planning objectives can be set. Planning objectives and constraints are then identified in consideration of problems, conditions, and needs identified.

National Objectives

Planning for navigational improvements of the West River area is based on the national objectives of National Economic Development (NED) and enhancement of Environmental Quality (EQ) as set forth in 1973 by the

National Water Resources Council in "Principles and Standards for Planning Water and Related Land Resources." The purpose of the "Principles and Standards" is to promote the quality of life by guiding planning efforts to assure the equal attainment of these national objectives as defined below:

NED Objective -

To enhance national economic development by increasing the value of the nation's output of goods and services and to improve national economic efficiency.

EQ Objective -

To enhance the quality of the environment by the management, conservation, preservation, creation, restoration and improvement of certain natural resources, cultural resources and ecological systems.

It must be emphasized that ideally the two national objectives should be sought equally. In this reconnaissance report, however, detailed environmental analyses were not possible in consideration of the funding limitations and study scope. This report, therefore, emphasizes the fulfillment of the NED objective more than the EQ objective. Any detailed project report will consider the EQ objective in much greater detail.

The Study Area and Existing Conditions

The town of Guilford, located in New Haven County, Connecticut, is situated on Long Island Sound, approximately 9 miles east of New Haven, and 30 miles west of New London. The town contains 46.2 square miles consisting of three general elements: 1) Guilford Village 2) the Long Island Sound shorefront and 3) the interior countryside. Due to its proximity to New Haven, Guilford is primarily a residential suburb. The town bears the distinction of having the largest concentration of historic buildings in Connecticut. It is zoned to permit expansion while preserving historic locations. Major highways serving Guilford are Interstate 95, U.S. Route 1, and State Routes 77, 80, and 146.

Rail freight and passenger service are available in New Haven, and air service may be obtained at the Tweed-New Haven Airport in East Haven. The 1970 population of Guilford was 12,033 for a population density of 260 persons/square mile. There is little industrial development in Guilford, but the local retail trade is strong. Prior to the industrialization of the Northeast in the early 1900's, agriculture, fisheries, retail trade, and the resort business were the major industries. Later, industrial expansion attracted workers to the various industries in New Haven, gradually transforming Guilford into a residential community.

Two rivers, the East and West, are located in Guilford. The East River is well developed due to the presence of Federal navigation facilities and is a popular recreational boating area. The West River

originates near the West Side Cemetery in Guilford, and flows southeasterly about 2.2 miles into Long Island Sound. At the present time, the portion of the river encompassed within the project area has an average depth of 3 feet MLW. Access from the West River to deep water is restricted by a controlling depth of 1-1/2 feet MLW near the mouth of the river.

The West River is shown on National Ocean Survey Chart 12373 and the U.S. Geological Survey Map titled, "Guilford, Connecticut."

Since the community began formulating a comprehensive Community Development Plan in the mid-1960's, it has been a local planning goal to develop commercial activities on the West River. The West River is the only available site for a significant potential increase in navigation facilities, especially for commercial craft. Local interests feel the West River could be utilized more efficiently if a deep channel could be opened and maintained. At present the river is utilized by recreational boaters and a small fishing fleet.

There are two boatyards located on the West River which provide service and storage for boats. One is located near the mouth of the river and the other is north of the railroad bridge. A marine hardware store is located about 1/2 mile inland. Fuel is available at the boatyard near the mouth of the river. One commercial operation located on the river has indicated that they intend to develop a support facility for local commercial fishermen, if the river is dredged to a depth that will attract commercial fishermen to the area.

Terminal and transfer facilities on the West River include one 10 ton travel lift, 15 and 20 ton cranes, and three marine railways capable of accommodating vessels up to 40 feet in length.

In 1971 the Guilford Yacht Club completed a private dredging project from deep water in Long Island Sound to the yacht club. If consists of a channel 4,350 feet long, 50 feet wide and 5 feet (MLW) deep.

Conditions if no Federal Action Taken

If no Federal action is taken, the shallow depth in the mouth of the river will restrict the use of the West River by boats having a draft of more than 2 feet, although it is anticipated that the river will continue to be heavily utilized by recreational craft. The lack of adequate channel depth, which limits access to unloading facilities on the West River, is expected to discourage commercial fishing operations.

Problems, Needs, and Opportunities

At present the West River is utilized to near capacity by a recreational fleet of approximately 225 craft and four full time fishing craft. There are two boatyards to provide service and storage for boats. The Guilford Yacht Club is also located on the West River. There are over

100 berths at the Club's facility, with space available for both transient and non-member boats. In 1978 commercial fishermen landed 70 tons of catch at facilities on the West River with 64 tons the estimated catch for 1979. The major problems on the West River are the shallow depths in the river and lack of additional anchorage space that would be required for fleet expansion. The lack of water compels many vessels, both recreational and commercial, to wait for adequate depth prior to entering the river, thus causing a considerable delay to the fleet and negating growth potential of the fishing fleet.

Establishing a Federal navigation channel of a sufficient depth and width in the West River would increase the efficiency of the existing fleet by allowing craft to navigate the river at will. Congestion caused by a large number of craft attempting to navigate the channel at a favorable tide would also be reduced.

Planning Constraints

In an attempt to develop management measures that may solve the problems and fulfill the needs identified above, consideration must be given to certain constraints, known to exist, that limit the available scope of solutions and are, therefore, used to direct plan formulation. Such constraints can be of many different types originating from different sources. They may include natural conditions within the project site, technological states of the art, economic limitations, or legislative restrictions.

The only significant planning constraint identified as limiting the scope of solutions for this study is the presence of tidal wetlands adjacent to over 90% of the West River. Development of tidal wetlands is considered to be generally inconsistent with the policies of the proposed Connecticut Coastal Area Management Program and not in the public interest. Therefore, the dredging of tidal wetland areas as a solution or part of a solution to navigation difficulties in the West River is not considered to be in the public interest.

Planning Objectives

Planning objectives are basically statements that restate national, state, and local water and related land resource management problems and needs for the given study area in a positive manner. Relative fulfillment of planning objectives is used as a measure for plan evaluation.

Planning objectives can be delineated by two methods of approach:

(1) Addressing known areas of public concern

(2) Anticipating future "without project" conditions to identify problems and needs not so readily apparent to the public at the present time.

Based on consideration of known areas of public concern and anticipation of "without project" conditions, the following planning objective was identified for the study.

1. Improve navigation conditions during the period 1980-2030 to increase fleet efficiency and reduce congestion on the West River.

FORMULATION OF PRELIMINARY PLANS

Consideration of the problems, needs, and opportunities led to the formulation of alternative preliminary plans. These plans, designed to achieve the National objectives and planning objective stated previously were developed in consideration of the previously identified planning constraints. State and local objectives were also paramount considerations in the evaluation of alternative plans.

Management Measures

As the basis for formulating alternative plans, a broad range of management measures can be identified to address the planning objective. Management measures can generally be categorized as either structural or non-structural, and each should be considered in equal detail.

Structural measures would generally involve dimensional variations of a main access channel in the West River. Nonstructural measures would principally involve the determination of achieving the planning objective by other means at lower costs, such as transferring vessels with deep drafts (in relation to the available channel depth) to more suitable harbors or rivers.

At this stage of study, the following management measures were identified.

(1) Dredge an access channel from deep water in Long Island Sound to provide free access to the channel at all tides.

(2) Transfer vessels with deep drafts to other rivers and harbors.

(3) Provide improved aids to navigation.

(4) Establish a new anchorage area to provide room for fleet expansion.

If a detailed study is performed an attempt will be made to identify more management measures.

Plan Formulation

Utilizing a knowledge of the problems and needs in the study area, management measures were combined into various plans for managing the area's resources. Resource plans were refined into definitive alternative

Plan Formulation

Utilizing a knowledge of the problems and needs in the study area, management measures were combined into various plans for managing the area's resources. Resource plans were refined into definitive alternative plans of action that meet the planning objectives and area needs. In this preliminary phase, four alternatives were identified as viable plans. Equal consideration was given to both structural and non-structural plans:

(1) No Action Plan - This consists of maintaining present conditions in the West River area. The result of this alternative would be a continuation of the current navigational difficultes and a probable reduction in commercial fishing activity on the river.

(2) Transfer Plan - This would involve moving the larger recreational and commercial craft to other rivers and harbors affording greater water depth than the West River in order to increase their operational efficiency.

(3) Dredging Plan 1 - This plan would involve dredging an access channel from deep water in Long Island Sound into the West River.

(4) Dredging Plan 2 - Dredge an access channel as described in Dredging Plan 1 and construct a new anchorage area.

ASSESSMENT OF A SINGLE PLAN

As stated in the introduction section of this report, the purpose of this report is not to formulate and assess the optimum plan of improvement but only to determine if there is some feasible plan that may prove to be in the Federal interest. This is done only as a decision making tool to evaluate the need for detailed study of many alternatives. The plan evaluated herein is not necessarily the plan that will be selected after a detailed analysis is performed. This plan is only evaluated over others herein based upon the availablty of data at this early stage of study.

Alternative Plan Chosen for Evaluation

For the purpose of evaluation of the need for detailed study, alternative three, the dredging of an access channel from Long Island Sound into the West River will be evaluated.

The plan to be evaluated is depicted graphically in Figure 1. It includes a main channel 6,500 long, 60 feet wide, and 6 feet (MLW) deep extending from the 6 foot depth contour in Long Island Sound to the railroad bridge at mile 0.8 on the West River. This is considered to be the minimal channel development adequate to accommodate the existing fleet. Expansion of the fleet is not anticipated due to the fact that the limited mooring capacity of the West River is being utilized to near capacity at

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Quantity estimates within the proposed channel area are based on a USGS Survey Map titled "Guilford, CT" and a field inspection of the area. The material to be dredged is assumed to be primarily mud and silt.

Local interests have indicated that a land disposal site adjacent to the river would be available for the disposal of dredged materials. This site has been used in estimating construction costs for this alternative. An analysis of disposal alternatives will be performed as part of any detailed report done by this office.

Estimate of First Costs

The plan of improvement would involve dredging a channel 60 feet wide and 6 feet deep from deepwater in Long Island Sound to the railroad bridge crossing the West River at mile 0.8 with the cost of construction proportioned between Federal and local interests. Maintenance of the dredged areas would be a Federal responsbility and the U.S. Coast Guard will provide and maintain all navigational aids. The estimated first cost is based on May 1980 price levels, using a continuous hydraulic dredging operation with disposal at a nearby land site. An estimate for navigational aids has been made for this report based on projects of similar size. Specific costs for navigational aids will be obtained from the U.S. Coast Guard if a detailed study is performed. Table I depicts the first cost of the evaluated plan of improvement.

Table I
FIRST COST

Dredging (Ordinary Material) 68,500 c.y. @ $3.25/c.y.		$222,625
Contingencies (15%)		33,390
Engineering and Design		17,810
Supervision and Administration		17,810
Subtotal		$291,635
U.S. Coast Guard Aids to Navigation		4,000
Total First Cost		$295,635
	Say	$295,600

Annual charges are based on an estimated project life of 50 years and an interest rate of 7-1/8%. Because of the rapid shoaling characteristics of Guilford Harbor, the channel most likely would be subject to frequent maintenance dredging in order to provide a depth adequate for reasonable utilization of the channel. Engineering estimates for the 1976 study assumed an annual shoal rate of 20%. However, the maintenance dredging history of the Federal navigation channel in the East River indicates that the annual shoal rate in the West River would be approximately 10%. Although the maintenance cost could be reduced by breakwaters at the river mouth, the cost of such breakwaters would be at least $120,000 a year and this would far exceed the maintenance dredging cost that would be reduced. Therefore, maintenance is based on an assumed annual shoal rate of 10%. The unit cost of maintenance dredging reflects the anticipated increase in cost necessitated by the use of alternative disposal areas in the future. The annual charges are shown in Table II.

Table II
Annual Charges

Interest and Amortization ($295,600 X .073607)	$21,760
Annual Maintenance 6,850 c.y. @ $3.90	26,715
Navigation Aids	1,000
Total Annual Charges	$49,475

Estimate of Benefits

Improvements in the West River would result in certain benefits to existing recreational boating interests and commercial fishing operations. Recreational benefits have been computed on the basis of net annual return to boatowners if their respective boats were for hire and in accordance with the established policy of the Corps of Engineers. Due to the lack of additional mooring space, it is anticipated that the recreational fleet will not experience any significant expansion in the future unless new mooring facilities are developed on the river.

experience tidal delays when entering or leaving the river. This would increase fisheries production to an estimated 82 tons per year representing a potential value of $53,500 per year.

Commercial benefits are shown in Table III. Recreational boating benefits are tabulated in Table IV. A summary of annual benefits is shown in Table V.

Table III
Commercial Fishing Benefits

1.	Increased Catch	12 Tons
2.	Value of Catch	$7,750

Table V
Total Annual Benefits

Recreational Fleet		$26,040
Commercial Fleet		$7,550
Total		$33,590
	Say	$33,600

Comparison of Benefits and Costs

As stated in the discussion of National objectives, National Economic development is one of the two prime national objectives. A proposed plan's contribution to the national economic development is measured by comparing the project's annual benefits and costs. If the benefits exceed the costs, the benefit-cost ratio (BCR) will be greater than one. If the BCR is greater than 1, the plan is considered to have a positive effect on the Nation's economic development. The BCR for the evaluated plan is presented in Table VI.

Table VI
COMPUTATION OF THE BENEFIT-COST RATIO

Benefits	Costs	B/C Ratio
33,600	49,475	0.68

CONCLUSION

Discussion

According to preliminary analysis, navigational improvements in the West River are not economically justified at the present time. The evalu-

1979 BOATING VALUES

TABLE IV BENEFITS TO RECREATIONAL BOATING

HARBOR: West River, Guilford, CT

TYPE OF CRAFT	LENGTH (feet)	# of Boats	DEPRECIATED VALUE Average $	DEPRECIATED VALUE Total $	PERCENT RETURN Ideal	PERCENT RETURN % of Ideal Pres.	PERCENT RETURN % of Ideal Fut.	PERCENT RETURN Gain	VALUE $	ON CRUISE Avg Days	ON CRUISE % of Season	ON CRUISE Value $
RECREATIONAL FLEET												
Outboards	15-20	31	3900	120900	13	90	100	1.30	1,571			
	21 & Up		7750									
Sterndrive	15-20	18	6550	117900	12	90	100	1.20	1,415			
	21-25	14	9850	137900	11	85	100	1.65	2,275			
	26 & Up		22600									
Inboards	15-20	7	7350	51450	12	90	100	1.20	617			
	21-30	28	16680	467040	12	85	100	1.80	8,407		9	757
	31-40	4	45500	182000	11	80	95	1.65	3,003		12	360
	41-50		103600									
	51-Up		240800									
Cruising Sailboats	15-20	16	4850	77600	8	90	100	0.80	621			
	21-30	17	15600	265200	8	85	100	1.20	3,182		5	159
	31-40	2	43200	86400	7	75	95	1.40	1,210		16	194
	41&Up		85550									
Daysailers	8-15	24	1400	33600	12	90	100	1.20	403			
	16-20	30	3450	103500	12	90	100	1.20	1,242			
	21-25	29	6350	184150	11	85	100	1.65	3,038		5	152
	26&Up	5	12050	60250	10	80	95	1.50	904		25	226
Totals		225		1,887,890					27,888			1,848

Net Annual Benefit = $27,888 - $1,848 = $26,040

Table VI
BENEFIT-COST RATIO

Benefits	Costs	B/C Ratio
33,600	49,475	0.68

ADDITIONAL PLAN CONSIDERED

In the plan formulation stage many structural solutions were evaluated in an attempt to find the plan that would maximize benefits while minimizing construction costs. A plan to dredge a channel to a point slightly north of the Guilford Yacht Club was considered in plan formulation but dropped in favor of the evaluated plan as a minimum structural plan that would maximize benefits. Dredging the shorter channel would have generated a benefit cost ratio of 0.65. The evaluated plan generated a benefit cost ratio of 0.68. This is because the benefits generated by the boatyard in the upper river exceed the incremental cost of extending the Federal channel from the yacht club area to the railroad bridge at mile 0.8.

CONCLUSION

Discussion

According to preliminary analysis, navigational improvements in the West River are not economically justified at the present time. The evaluated plan of improvement was considered to be the minimal plan sufficient to meet the needs of craft utilizing the West River. This plan was not found to be economically justified at the present time as the B/C ratio was less than unity.

Recommendation

The Division Engineer recommends no further study of the West River be undertaken at this time.

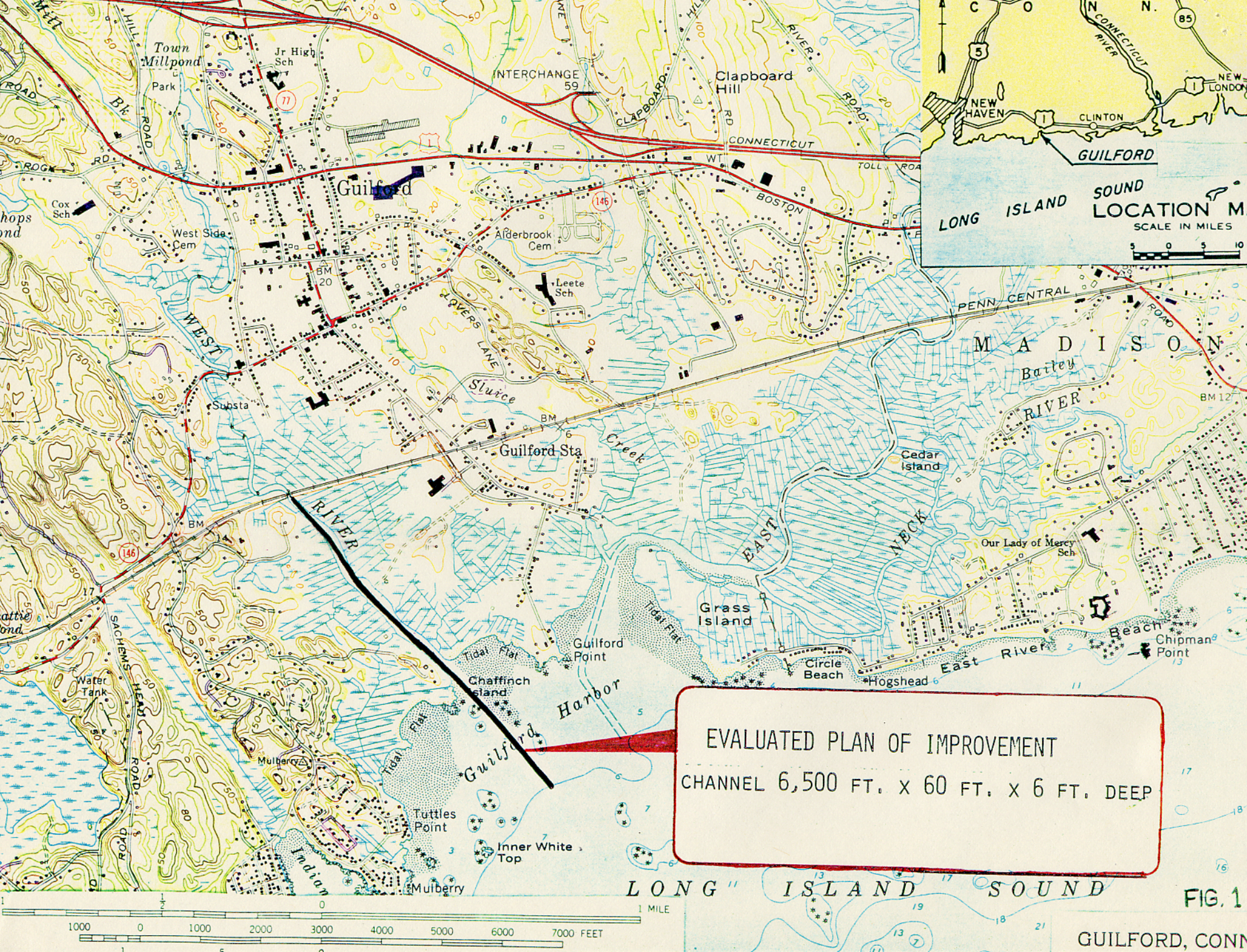

FIG. 1

GUILFORD, CONN